

WHAT IS CLAIMED IS:

1. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof in a concentration of at least about 50 grams acid equivalent per liter;

a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof; and, at least one surfactant;

wherein (i) the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1.7:1, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

2. The aqueous herbicidal liquid concentrate of claim 1 wherein the glyphosate concentration ranges from at least about 100 grams to about 400 grams acid equivalent per liter.

3. The aqueous herbicidal liquid concentrate of claim 1 wherein the pyridine analog concentration ranges from at least about 8 to about 20 grams acid equivalent per liter.

4. The aqueous herbicidal liquid concentrate of claim 1 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 8:1.

5. The aqueous herbicidal liquid concentrate of claim 1 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

6. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof;

5 a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof; and,

at least one surfactant in a concentration ranging from about 1 grams to 283 grams per liter;

10 wherein (i) the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

7. The aqueous herbicidal liquid concentrate of claim 6 wherein the glyphosate concentration ranges from at least about 100 grams to about 400 grams acid equivalent per liter.

8. The aqueous herbicidal liquid concentrate of claim 6 wherein the pyridine analog concentration ranges from at least about 8 to about 20 grams acid equivalent per liter.

9. The aqueous herbicidal liquid concentrate of claim 6 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 8:1.

10. The aqueous herbicidal liquid concentrate of claim 6 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

11. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof;

5 a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof, in a concentration ranging from about 1 gram to 99 grams (acid equivalent basis) per liter; and,

at least one surfactant;

10 wherein (i) the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an  
15 alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

12. The aqueous herbicidal liquid concentrate of claim 11 wherein the glyphosate concentration ranges from at least about 100 grams to about 400 grams acid equivalent per liter.

13. The aqueous herbicidal liquid concentrate of claim 11 wherein the pyridine analog concentration ranges from at least about 8 grams to about 20 grams acid equivalent per liter.

14. The aqueous herbicidal liquid concentrate of claim 11 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 8:1.

15. The aqueous herbicidal liquid concentrate of claim 11 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

16. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof;

5 a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof; and,

at least one surfactant;

10 wherein (i) the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, (ii) the glyphosate (acid equivalent basis) and the surfactant are present in a weight ratio of at least 1:1, wherein glyphosate is in excess in both instances, and (iii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

17. The aqueous herbicidal liquid concentrate of claim 16 wherein the glyphosate concentration ranges from at least about 100 grams to about 400 grams acid equivalent per liter.

18. The aqueous herbicidal liquid concentrate of claim 16 wherein the pyridine analog concentration ranges from at least about 8 to about 20 grams acid equivalent per liter.

19. The aqueous herbicidal liquid concentrate of claim 16 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 8:1.

20. The aqueous herbicidal liquid concentrate of claim 16 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

21. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof; and,

5 a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof;

wherein the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess, and further wherein (i) the pyridine analog or a herbicidal derivative thereof is present at a concentration of not greater than 99 grams (acid equivalent) per liter, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

22. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof; and,

5 a pyridine analog, or a herbicidal derivative thereof;

wherein the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess, and further wherein (i) the glyphosate (acid equivalent basis) or herbicidal derivative thereof is present at a concentration of not greater than 165 grams (acid equivalent) per liter, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

23. The aqueous herbicidal liquid concentrate of claim 21 or 22 wherein said concentrate further comprises a surfactant.

24. The aqueous herbicidal liquid concentrate of claim 21 or 22 wherein the glyphosate concentration ranges from at least about 75 grams to about 160 grams acid equivalent per liter.

25. The aqueous herbicidal liquid concentrate of claim 21 or 22 wherein the pyridine analog concentration ranges from at least about 8 to about 20 grams acid equivalent per liter.

26. The aqueous herbicidal liquid concentrate of claim 21 or 22 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

27. An aqueous herbicidal liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

at least one glyphosate salt predominantly in the form of potassium  
5 glyphosate, monoethanolamine glyphosate, or a mixture thereof;

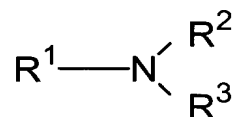
a pyridine analog selected from the group consisting of triclopyr, clopyralid, fluroxypyr, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof; and,

at least one surfactant in a concentration less than 20 grams per liter;

10 wherein the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess.

28. The aqueous herbicidal liquid concentrate of one of preceding claims 1, 6, 11, 16, 21, 22 or 27 wherein said surfactant is selected from the group consisting of:

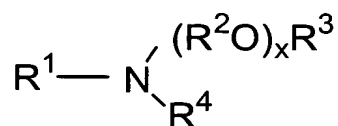
(a) a secondary or tertiary amine having the formula:



(1)

wherein  $\text{R}^1$  and  $\text{R}^2$  are hydrocarbyl having from 1 to about 30 carbon atoms, and  $\text{R}^3$  is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

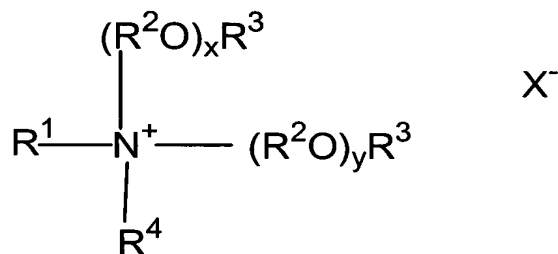
(b) a monoalkoxylated amine having the formula:



(2)

wherein  $\text{R}^1$  and  $\text{R}^4$  are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or  $-\text{R}^5\text{SR}^6$ ,  $\text{R}^2$  in each of the  $x$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^5$  is a linear or branched alkyl group having from about 6 to about 30 carbon atoms,  $\text{R}^6$  is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and  $x$  is an average number from 1 to about 60;

(c) a dialkoxylated quaternary ammonium salt having the formula:

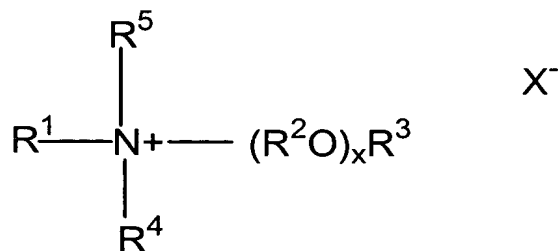


(3)

wherein  $\text{R}^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $\text{R}^2$  in each of the  $x$   $(\text{R}^2\text{O})$  and  $y$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^4$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having

from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X<sup>-</sup> is an agriculturally acceptable anion;

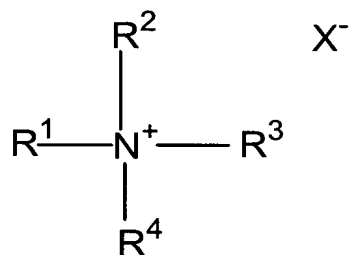
(d) a monoalkoxylated quaternary ammonium salt having the formula:



(4)

wherein R<sup>1</sup> and R<sup>5</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>4</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X<sup>-</sup> is an agriculturally acceptable anion;

(e) a quaternary ammonium salt having the formula:

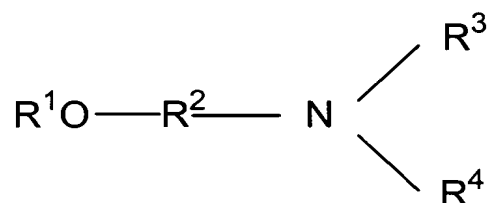


(5)

wherein R<sup>1</sup>, R<sup>3</sup> and R<sup>4</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X<sup>-</sup> is an agriculturally acceptable anion;

(f) an ether amines having the formula:

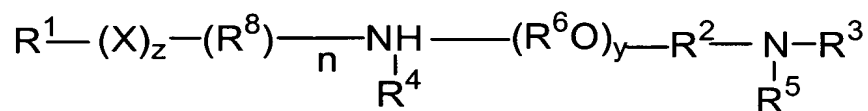




(6)

wherein  $\text{R}^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $\text{R}^2$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms;  $\text{R}^3$  and  $\text{R}^4$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^5\text{O})_x\text{R}^6$ ,  $\text{R}^5$  in each of the  $x(\text{R}^5\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^6$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 50;

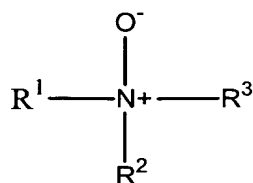
(g) a diamine having the formula:



(7)

wherein  $\text{R}^1$ ,  $\text{R}^3$ ,  $\text{R}^4$  and  $\text{R}^5$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^6\text{O})_x\text{R}^7$ ;  $\text{R}^2$  and  $\text{R}^8$  are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $\text{R}^6$  in each of the  $x(\text{R}^6\text{O})$  and  $y(\text{R}^6\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^7$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $x$  is an average number from 1 to about 30,  $\text{X}$  is  $-\text{O}-$ ,  $-\text{N}(\text{R}^6)-$ ,  $-\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{O}-$ ,  $-\text{OC}(\text{O})-$ ,  $-\text{N}(\text{R}^9)\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{N}(\text{R}^9)-$ ,  $-\text{S}-$ ,  $-\text{SO}-$ , or  $-\text{SO}_2-$ ,  $y$  is 0 or an average number from 1 to about 30,  $n$  and  $z$  are independently 0 or 1, and  $\text{R}^9$  is hydrogen or hydrocarbyl or substituted hydrocarbyl;

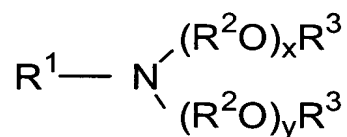
(h) an amine oxide having the formula:



(8)

wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl,  $-(\text{R}^4\text{O})_x\text{R}^5$ , or  $-\text{R}^6(\text{OR}^4)_x\text{OR}^5$ ;  $\text{R}^4$  in each of the  $x$   $(\text{R}^4\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^5$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $\text{R}^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms,  $x$  is an average number from 1 to about 50, and the total number of carbon atoms in  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is at least 8;

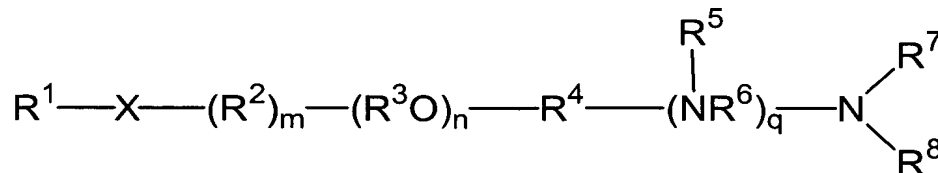
(i) a dialkoxylated amine having the formula:



(9)

wherein  $\text{R}^1$  is a hydrocarbyl or substituted hydrocarbyl having from about 6 to about 30 carbon atoms, or  $-\text{R}^4\text{SR}^5$ ,  $\text{R}^4$  and  $\text{R}^2$  in each of the  $x$   $(\text{R}^2\text{O})$  and the  $y$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^5$  is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and  $x$  and  $y$  are independently an average number from 1 to about 40;

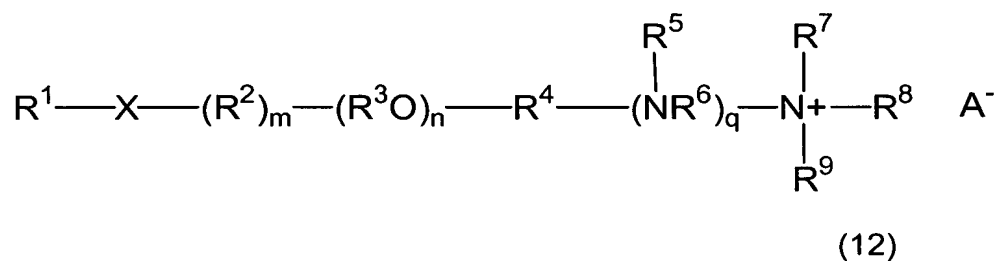
(j) an aminated alkoxyated alcohol having the structure:



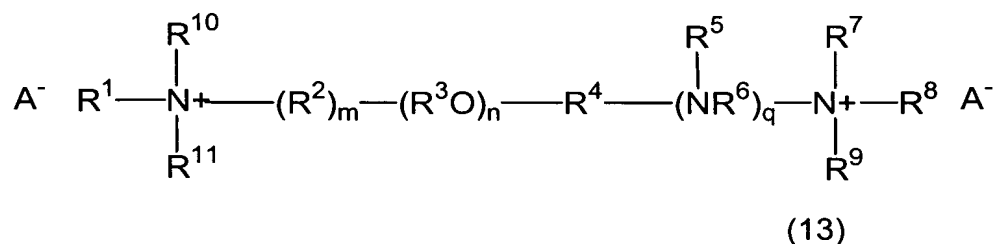
(10)

wherein  $R^1$ ,  $R^7$ ,  $R^8$ , and  $R^9$  are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{11})_s(R^3O)_vR^{10}$ ; X is  $-O-$ ,  $-OC(O)-$ ,  $-C(O)O-$ ,  $-N(R^{12})C(O)-$ ,  $-C(O)N(R^{12})-$ ,  $-S-$ ,  $-SO-$ ,  $-SO_2-$  or  $-N(R^9)-$ ;  $R^3$  in each of the  $n$   $(R^3O)$  groups and the  $v$   $(R^3O)$  groups is independently  $C_2-C_4$  alkylene;  $R^{10}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $R^2$  and  $R^{11}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms;  $R^{12}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $q$  is an integer from 0 to 5; and  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

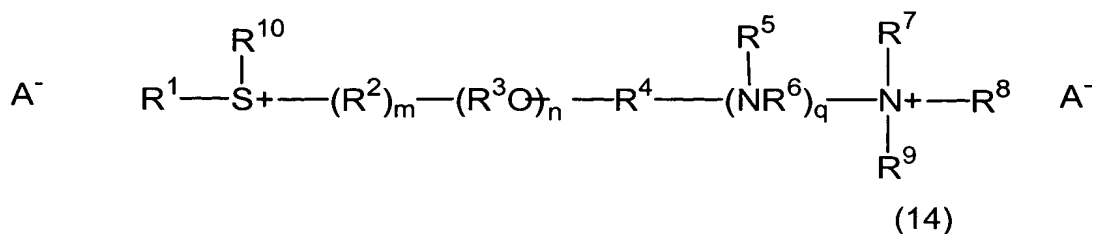
(k) a quaternary ammonium, sulfonium and sulfoxonium salt having the formula:



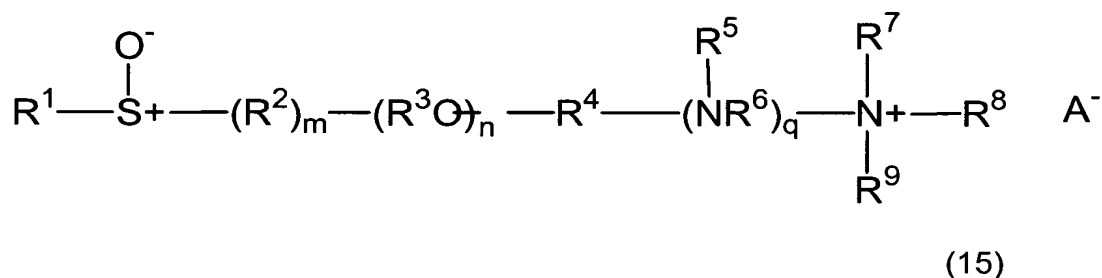
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or

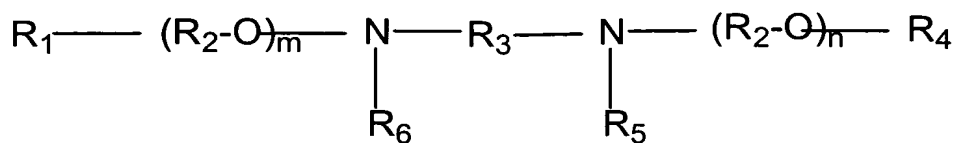


or



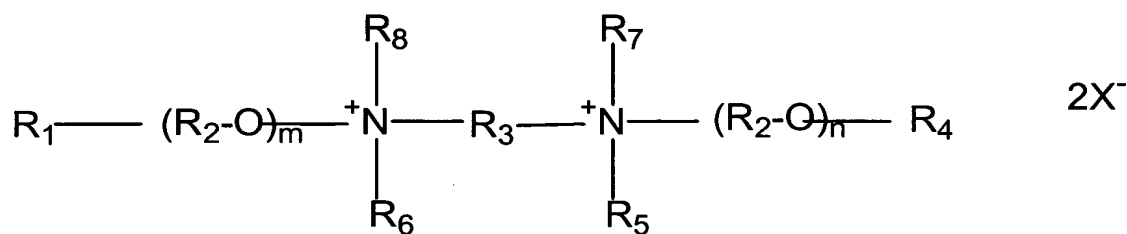
- 5 wherein  $R^1$ ,  $R^7$ ,  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{13})_s(R^3O)_vR^{12}$ ;  $X$  is  $-O-$ ,  $-OC(O)-$ ,  $-N(R^{14})C(O)-$ ,  $-C(O)N(R^{14})-$ ,  $-C(O)O-$ , or  $-S-$ ;  $R^3$  in each of the  $n$   $(R^3O)$  groups and  $v$   $(R^3O)$  groups is independently  $C_2$ - $C_4$  alkylene;  $R^{12}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $R^2$  and  $R^{13}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $R^{14}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $q$  is an integer from 0 to 5;  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each  $A^{-}$  is an agriculturally acceptable anion;

(I) a diamine or diammonium salt having the formula:



(16)

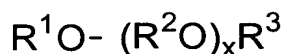
or



(17)

wherein  $R^1$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$  and  $R^8$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $m$  ( $R^2O$ ) and  $n$  ( $R^2O$ ) groups and  $R^9$  are independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or  $-(R^2O)_pR^9$ ,  $m$  and  $n$  are individually an average number from 0 to about 50, and  $p$  is an average number from 0 to about 60;

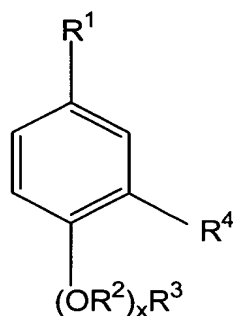
(m) an alkoxyated alcohol having the formula:



(18)

wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 60;

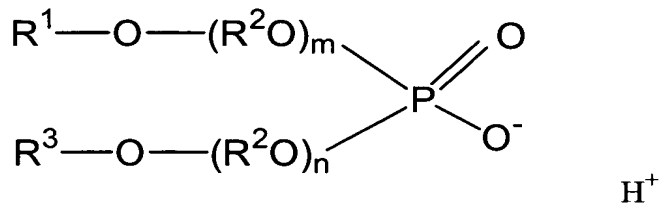
(n) an alkoxyated dialkylphenol having the formula:



(19)

wherein R¹ and R⁴ are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R¹ and R⁴ is an alkyl group, R² in each of the x (R²O) groups is independently C₂-C₄ alkylene, R³ is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60;

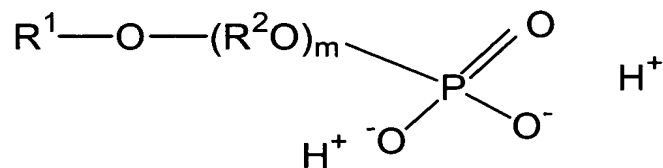
(o) an alkyl alkoxyated phosphate having the formula:



(20)

wherein R¹ and R³ are independently a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms; R² in each of the m (R²O) and the n (R²O) groups is independently C₂-C₄ alkylene; and m and n are independently from 1 to about 30;

(p) an alkyl alkoxyated phosphate having the formula:



(21)

wherein  $R^1$  is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  is from 1 to about 30;

and mixtures or combinations thereof.

29. An aqueous herbicidal composition useful for killing or controlling the growth of unwanted plants comprising:

glyphosate or a herbicidal derivative thereof;

pyridine analog or a herbicidal derivative thereof; and,

at least one surfactant;

wherein the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 7.6:1, and further wherein when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a  $C_3$ - $C_{16}$  alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a  $C_3$ - $C_{16}$  alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

30. The aqueous herbicidal composition of claim 29 wherein the glyphosate concentration ranges from about 4 grams to about 25 grams acid equivalent per liter.

31. The aqueous herbicidal composition of claim 29 wherein the pyridine analog concentration ranges from about 0.4 grams to about 6 grams acid equivalent per liter.

32. The aqueous herbicidal composition of claim 29 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 15:1.

33. An aqueous herbicidal composition useful for killing or controlling the growth of unwanted plants comprising:

glyphosate or a herbicidal derivative thereof;

5 a pyridine analog selected from the group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof, in a concentration of not greater than 3.9 grams (acid equivalent basis) per liter; and, at least one surfactant;

10 wherein (i) the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least about 1:1, glyphosate being in excess, and (ii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

34. The aqueous herbicidal composition of claim 33 wherein the glyphosate concentration ranges from about 4 grams to about 25 grams acid equivalent per liter.

35. The aqueous herbicidal composition of claim 33 wherein the pyridine analog concentration ranges from about 0.4 grams to about 3 grams acid equivalent per liter.

36. The aqueous herbicidal composition of claim 33 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

37. An aqueous herbicidal composition useful for killing or controlling the growth of unwanted plants comprising:

glyphosate, or a herbicidal derivative thereof;



a pyridine analog selected from the group consisting of triclopyr, clopyralid,  
5 dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof; and,  
at least one surfactant;

wherein (i) the surfactant concentration is not greater than 3.9 grams per liter,  
(ii) glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis)  
are present in a weight ratio of at least 3:1, and (iii) when the glyphosate is  
10 predominantly in the form of a salt, said salt is selected from the group consisting of  
a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub>  
alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub>  
alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations  
thereof.

38. An aqueous herbicidal composition useful for killing or controlling the  
growth of unwanted plants comprising:

glyphosate, or a herbicidal derivative thereof;  
a pyridine analog, or a herbicidal derivative thereof; and,  
5 at least one surfactant;

wherein (i) the surfactant concentration is not greater than 6.6 grams per liter,  
(ii) glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis)  
are present in a weight ratio of at least 5:1, and (iii) when the glyphosate is  
10 predominantly in the form of a salt, said salt is selected from the group consisting of  
a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub>  
alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub>  
alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations  
thereof.

39. An aqueous herbicidal composition useful for killing or controlling the  
growth of unwanted plants comprising:

glyphosate, or a herbicidal derivative thereof;  
a pyridine analog, or a herbicidal derivative thereof; and,  
5 at least one surfactant;

wherein (i) the surfactant concentration is not greater than 9.3 grams per liter, (ii) glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 7:1, and (iii) when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a  $C_3$ - $C_{16}$  alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a  $C_3$ - $C_{16}$  alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

40. The aqueous herbicidal composition of one of claims 37, 38 or 39 wherein the glyphosate concentration ranges from about 4 grams to about 25 grams acid equivalent per liter.

41. The aqueous herbicidal composition of one of claims 37, 38 or 39 wherein the pyridine analog concentration ranges from about 0.4 grams to about 6 grams acid equivalent per liter.

42. An aqueous herbicidal composition useful for killing or controlling the growth of unwanted plants comprising:

glyphosate or a herbicidal derivative thereof;  
pyridine analog or a herbicidal derivative thereof; and,  
at least one surfactant;  
wherein either

(i) the glyphosate concentration (acid equivalent basis) is not greater than 16.2 grams per liter, and the glyphosate (acid equivalent basis) and pyridine analog (acid equivalent basis) are present in a weight ratio of at least 4:1; or

(ii) the glyphosate concentration (acid equivalent basis) is not greater than 23.8 grams per liter, and the glyphosate (acid equivalent basis) and pyridine analog (acid equivalent basis) are present in a weight ratio of at least 6:1;

and further wherein when the glyphosate is predominantly in the form of a salt, said salt is selected from the group consisting of a sodium salt, an ammonium salt, an alkylammonium salt, a C<sub>3</sub>-C<sub>16</sub> alkanolammonium salt, a di-ammonium salt, an alkylamine salt, a C<sub>3</sub>-C<sub>16</sub> alkanolamine salt, an alkylsulfonium salt, a sulfoxonium salt, and combinations thereof.

43. The aqueous herbicidal composition of claim 42 wherein the glyphosate concentration is not greater than about 15 grams acid equivalent per liter and the weight ratio (a.e. to a.e.) of glyphosate to pyridine analog is at least about 10:1.

44. The aqueous herbicidal composition of claim 42 wherein the glyphosate concentration is not greater than about 20 grams acid equivalent per liter and the weight ratio (a.e. to a.e.) of glyphosate to pyridine analog is at least about 10:1.

45. The aqueous herbicidal composition of claim 42 wherein the pyridine analog concentration ranges from about 0.4 grams to about 6 grams acid equivalent per liter.

46. An aqueous herbicidal composition useful for killing or controlling the growth of unwanted plants comprising:

at least one glyphosate salt predominantly in the form of potassium glyphosate, monoethanolamine glyphosate, or a mixture thereof; and

a pyridine analog selected from the group consisting of triclopyr, clopyralid, fluroxypyr, dithiopyr, thiazopyr and picloram, or a herbicidal derivative thereof;

wherein (i) the glyphosate salt is present in a concentration less than 180 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess; (ii) the glyphosate salt is present in a concentration less than 240 grams acid equivalent per liter and the glyphosate salt (acid equivalent

basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 2:1; (iii) the glyphosate salt is present in a concentration less than 270 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 3:1; (iv) the glyphosate salt is present in a concentration less than 288 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 4:1; (v) the glyphosate salt is present in a concentration less than 300 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 5:1; (vi) the glyphosate salt is present in a concentration less than 308 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 6:1; (vii) the glyphosate salt is present in a concentration less than 315 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 7:1; (viii) the glyphosate salt is present in a concentration less than 320 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 8:1; (ix) the glyphosate salt is present in a concentration less than 324 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 9:1; or (x) the glyphosate salt is present in a concentration less than 326 grams acid equivalent per liter and the glyphosate salt (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 10:1.

47. The aqueous herbicidal composition of claim 46 wherein the glyphosate concentration ranges from about 4 grams to about 25 grams acid equivalent per liter.

48. The aqueous herbicidal composition of claim 46 wherein the pyridine analog concentration ranges from about 0.8 grams to about 2 grams acid equivalent per liter.

49. The aqueous herbicidal composition of claim 46 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 11:1.

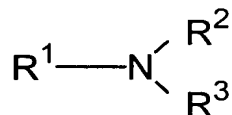
50. The aqueous herbicidal composition of claim 46 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 15:1.

51. The aqueous herbicidal composition of claim 46 further comprising a surfactant.

52. The aqueous herbicidal composition of claim 51 wherein the composition is a liquid concentrate which may be diluted with water to provide an aqueous herbicidal application mixture for application to the foliage of a plant.

53. The aqueous herbicidal composition of one of preceding claims 29, 33, 37, 38, 39, 42 or 51 wherein said surfactant is selected from the group consisting of:

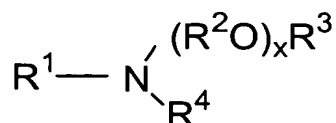
(a) a secondary or tertiary amine having the formula:



(1)

wherein  $\text{R}^1$  and  $\text{R}^2$  are hydrocarbyl having from 1 to about 30 carbon atoms, and  $\text{R}^3$  is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

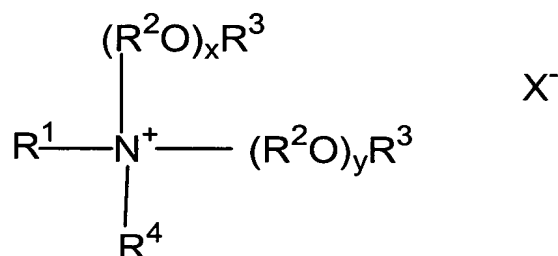
(b) a monoalkoxylated amine having the formula:



(2)

wherein  $R^1$  and  $R^4$  are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or  $-R^5SR^6$ ,  $R^2$  in each of the  $x$  ( $R^2O$ ) groups is independently  $C_2-C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $R^5$  is a linear or branched alkyl group having from about 6 to about 30 carbon atoms,  $R^6$  is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and  $x$  is an average number from 1 to about 60;

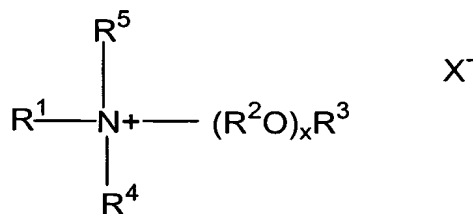
(c) a dialkoxylated quaternary ammonium salt having the formula:



(3)

wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$  ( $R^2O$ ) and  $y$  ( $R^2O$ ) groups is independently  $C_2-C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $R^4$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $x$  and  $y$  are independently an average number from 1 to about 40, and  $X^-$  is an agriculturally acceptable anion;

(d) a monoalkoxylated quaternary ammonium salt having the formula:

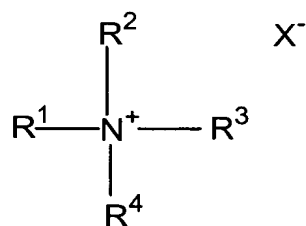


(4)

wherein  $R^1$  and  $R^5$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^4$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$  ( $R^2O$ )

groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X<sup>-</sup> is an agriculturally acceptable anion;

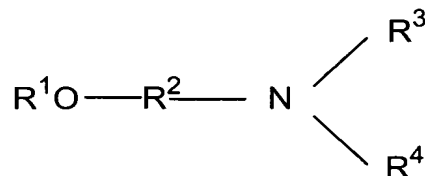
(e) a quaternary ammonium salt having the formula:



10 (5)

wherein R<sup>1</sup>, R<sup>3</sup> and R<sup>4</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X<sup>-</sup> is an agriculturally acceptable anion;

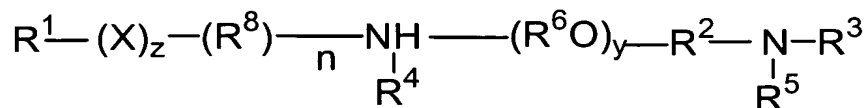
15 (f) an ether amine having the formula:



(6)

wherein R<sup>1</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R<sup>2</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R<sup>3</sup> and R<sup>4</sup> are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or -(R<sup>5</sup>O)<sub>x</sub>R<sup>6</sup>, R<sup>5</sup> in each of the x(R<sup>5</sup>-O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>6</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

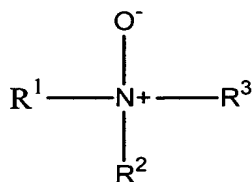
25 (g) a diamine having the formula:



5 (7)

wherein  $R^1$ ,  $R^3$ ,  $R^4$  and  $R^5$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^6O)_xR^7$ ;  $R^2$  and  $R^8$  are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $R^6$  in each of the  $x$  ( $R^6O$ ) and  $y$  ( $R^6O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^7$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $x$  is an average number from 1 to about 30,  $X$  is  $-O-$ ,  $-N(R^6)-$ ,  $-C(O)-$ ,  $-C(O)O-$ ,  $-OC(O)-$ ,  $-N(R^9)C(O)-$ ,  $-C(O)N(R^9)-$ ,  $-S-$ ,  $-SO-$ , or  $-SO_2-$ ,  $y$  is 0 or an average number from 1 to about 30,  $n$  and  $z$  are independently 0 or 1, and  $R^9$  is hydrogen or hydrocarbyl or substituted hydrocarbyl;

15 (h) an amine oxide having the formula:

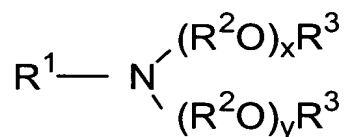


(8)

wherein  $R^1$ ,  $R^2$  and  $R^3$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl,  $-(R^4O)_xR^5$ , or  $-R^6(OR^4)_xOR^5$ ;  $R^4$  in each of the  $x$  ( $R^4O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^5$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms,  $x$  is an average number from 1 to about 50, and the total number of carbon atoms in  $R^1$ ,  $R^2$  and  $R^3$  is at least 8;

(i) a dialkoxyated amine having the formula:

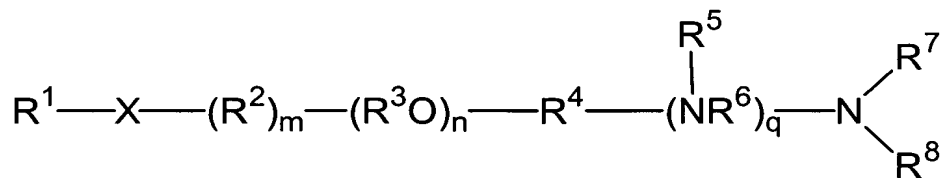




(9)

5 wherein  $\text{R}^1$  is a hydrocarbyl or substituted hydrocarbyl having from about 6 to about 30 carbon atoms, or  $-\text{R}^4\text{SR}^5$ ,  $\text{R}^4$  and  $\text{R}^5$  in each of the  $x$   $(\text{R}^2\text{O})$  and the  $y$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^5$  is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and  $x$  and  $y$  are independently an  
10 average number from 1 to about 40;

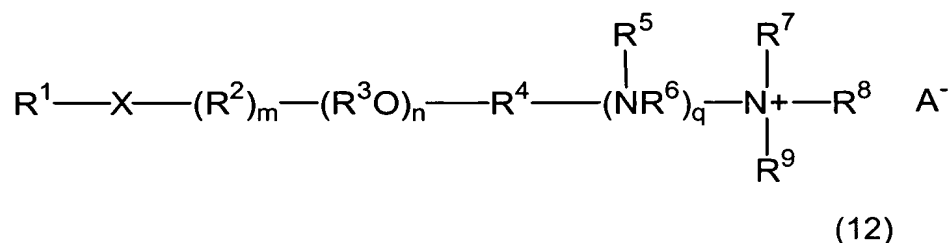
(j) an aminated alkoxyated alcohol having the structure:



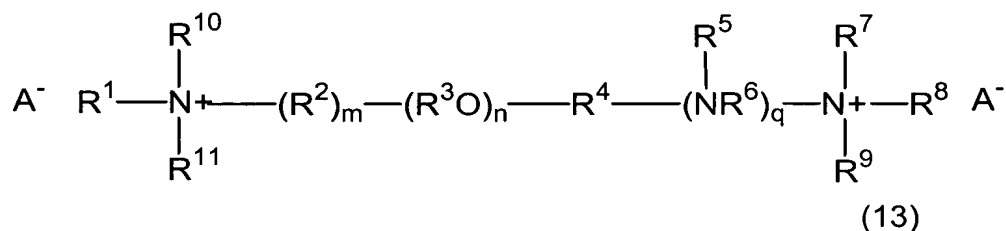
(10)

15 wherein  $\text{R}^1$ ,  $\text{R}^7$ ,  $\text{R}^8$ , and  $\text{R}^9$  are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(\text{R}^{11})_s(\text{R}^3\text{O})_v\text{R}^{10}$ ;  $\text{X}$  is  $-\text{O}-$ ,  $-\text{OC}(\text{O})-$ ,  $-\text{C}(\text{O})\text{O}-$ ,  $-\text{N}(\text{R}^{12})\text{C}(\text{O})-$ ,  $-\text{C}(\text{O})\text{N}(\text{R}^{12})-$ ,  $-\text{S}-$ ,  $-\text{SO}-$ ,  $-\text{SO}_2-$  or  $-\text{N}(\text{R}^9)-$ ;  $\text{R}^3$  in each of the  $n$   $(\text{R}^3\text{O})$  groups and the  $v$   $(\text{R}^3\text{O})$  groups is independently  $\text{C}_2$ - $\text{C}_4$   
20 alkylene;  $\text{R}^{10}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $\text{R}^2$  and  $\text{R}^{11}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $\text{R}^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon  
25 atoms;  $\text{R}^{12}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $\text{R}^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-\text{C}(=\text{NR}^{12})-$ ,  $-\text{C}(\text{S})-$ , or  $-\text{C}(\text{O})-$ ;  $q$  is an integer from 0 to 5; and  $\text{R}^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

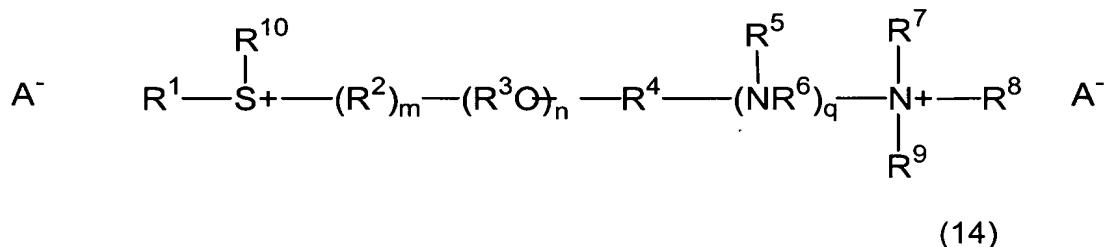
(k) a quaternary ammonium, sulfonium or sulfoxonium salt having the formula:



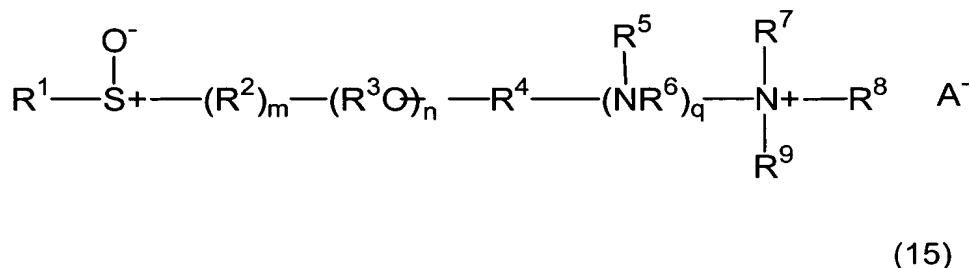
or



or



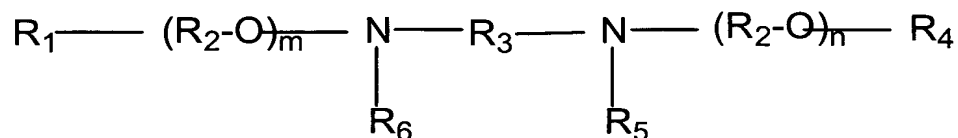
or



wherein  $R^1$ ,  $R^7$ ,  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{13})_s(R^3O)_vR^{12}$ ; X is -O-, -OC(O)-, -N( $R^{14}$ )C(O)-, -C(O)N( $R^{14}$ )-, -C(O)O-, or -S-;  $R^3$  in each of the n ( $R^3O$ ) groups and v ( $R^3O$ ) groups is independently  $C_2$ - $C_4$  alkylene;  $R^{12}$  is hydrogen,

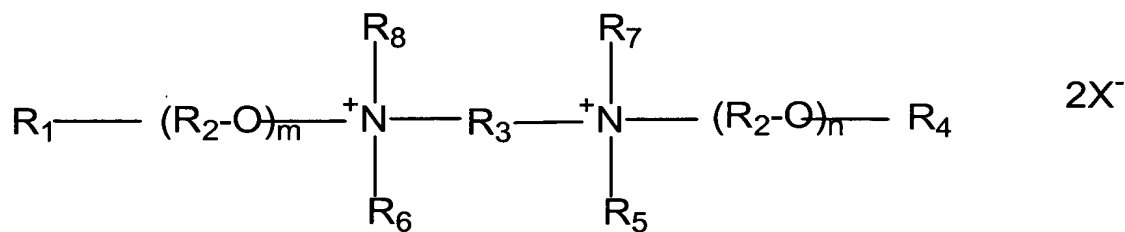
or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R<sup>2</sup> and R<sup>13</sup> are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R<sup>4</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R<sup>6</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, -C(=NR<sup>12</sup>)-, -C(S)-, or -C(O)-; R<sup>14</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from 0 to 5; R<sup>5</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A<sup>-</sup> is an agriculturally acceptable anion;

(l) a diamine or diammonium salt having the formula:



(16)

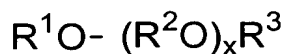
or



(17)

wherein R<sup>1</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup> and R<sup>8</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the m (R<sup>2</sup>O) and n (R<sup>2</sup>O) groups and R<sup>9</sup> are independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or -(R<sup>2</sup>O)<sub>p</sub>R<sub>9</sub>-, m and n are individually an average number from 0 to about 50, and p is an average number from 0 to about 60;

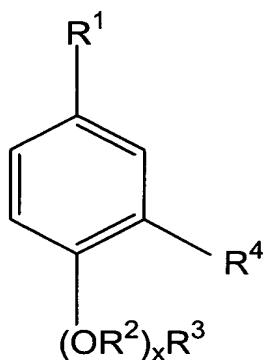
(m) an alkoxyated alcohol having the formula:



(18)

wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$   $(R^2O)$  groups is independently  $C_2-C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 60;

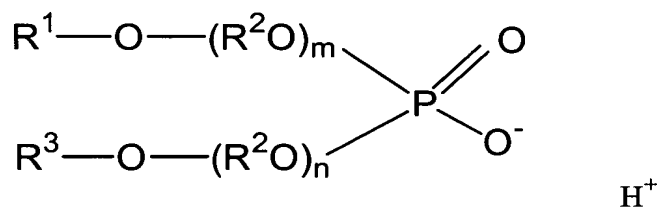
(n) alkoxyated dialkylphenols having the formula:



(19)

wherein  $R^1$  and  $R^4$  are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of  $R^1$  and  $R^4$  is an alkyl group,  $R^2$  in each of the  $x$   $(R^2O)$  groups is independently  $C_2-C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 60;

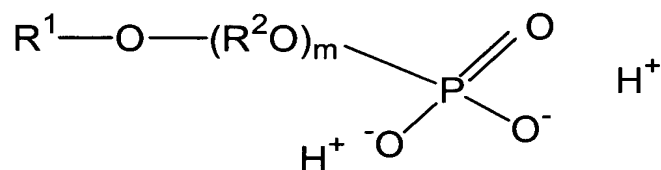
(o) an alkyl alkoxyated phosphate having the formula:



(20)

wherein  $R^1$  and  $R^3$  are independently a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) and the  $n$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  and  $n$  are independently from 1 to about 30;

5 (p) an alkyl alkoxylated phosphate having the formula:



10 (21)

wherein  $R^1$  is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  is from 1 to about 30;

and mixtures or combinations thereof.

54. A herbicidal particulate solid concentrate which may be dissolved or dispersed in water to provide an aqueous herbicidal application mixture for application to the foliage of a plant, the concentrate comprising:

glyphosate or a herbicidal derivative thereof; and,

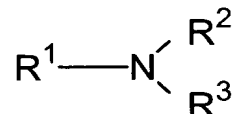
5 pyridine analog or a herbicidal derivative thereof,

wherein the glyphosate (acid equivalent basis) and the pyridine analog (acid equivalent basis) are present in a weight ratio of at least 1:1, glyphosate being in excess.

55. The herbicidal particulate solid concentrate of claim 54 further comprising at least one surfactant.

56. The herbicidal particulate solid concentrate of claim 55 wherein said surfactant is selected from the group consisting of:

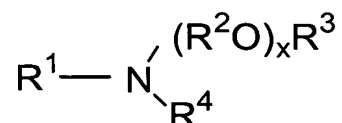
(a) a secondary or tertiary amine having the formula:



(1)

5 wherein  $\text{R}^1$  and  $\text{R}^2$  are hydrocarbyl having from 1 to about 30 carbon atoms, and  $\text{R}^3$  is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

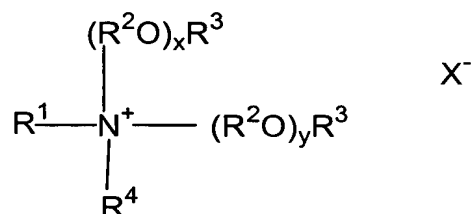
(b) a monoalkoxylated amine having the formula:



(2)

10 wherein  $\text{R}^1$  and  $\text{R}^4$  are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or  $-\text{R}^5\text{SR}^6$ ,  $\text{R}^2$  in each of the  $x$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^5$  is a linear or branched alkyl group having from about 6 to about 30 carbon atoms,  $\text{R}^6$  is a hydrocarbyl or substituted  
15 hydrocarbyl group having from 4 to about 15 carbon atoms and  $x$  is an average number from 1 to about 60;

(c) a dialkoxylated quaternary ammonium salt having the formula:



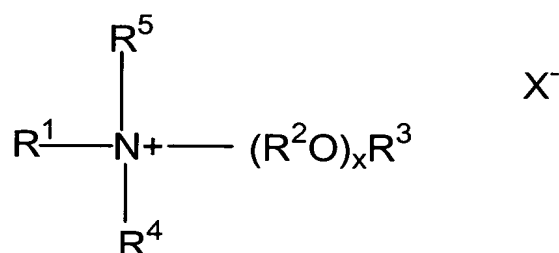
(3)

20 wherein  $\text{R}^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $\text{R}^2$  in each of the  $x$   $(\text{R}^2\text{O})$  and  $y$   $(\text{R}^2\text{O})$  groups is independently  $\text{C}_2\text{-C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^4$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having

from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X<sup>-</sup> is an agriculturally acceptable anion;

(d) a monoalkoxylated quaternary ammonium salt having the formula:

5

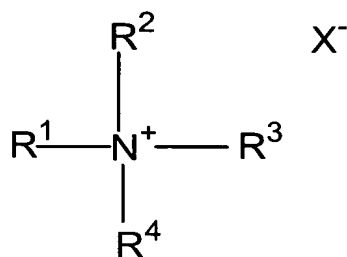


(4)

10 wherein R<sup>1</sup> and R<sup>5</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>4</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> in each of the x (R<sup>2</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>3</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to  
15 about 60, and X<sup>-</sup> is an agriculturally acceptable anion;

(e) a quaternary ammonium salt having the formula:

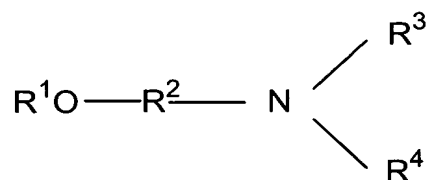
20



(5)

wherein R<sup>1</sup>, R<sup>3</sup> and R<sup>4</sup> are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R<sup>2</sup> is hydrocarbyl or substituted  
25 hydrocarbyl having from 1 to about 30 carbon atoms, and X<sup>-</sup> is an agriculturally acceptable anion;

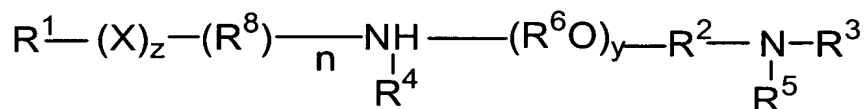
(f) an ether amine having the formula:



(6)

wherein R<sup>1</sup> is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R<sup>2</sup> is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R<sup>3</sup> and R<sup>4</sup> are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or -(R<sup>5</sup>O)<sub>x</sub>R<sup>6</sup>, R<sup>5</sup> in each of the x(R<sup>5</sup>-O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>6</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

(g) a diamine having the formula:

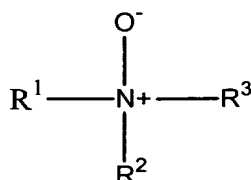


(7)

wherein R<sup>1</sup>, R<sup>3</sup>, R<sup>4</sup> and R<sup>5</sup> are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or -(R<sup>6</sup>O)<sub>x</sub>R<sup>7</sup>; R<sup>2</sup> and R<sup>8</sup> are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R<sup>6</sup> in each of the x (R<sup>6</sup>O) and y (R<sup>6</sup>O) groups is independently C<sub>2</sub>-C<sub>4</sub> alkylene, R<sup>7</sup> is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, -N(R<sup>6</sup>)-, -C(O)-, -C(O)O-, -OC(O)-, -N(R<sup>9</sup>)C(O)-, -C(O)N(R<sup>9</sup>)-, -S-, -SO-, or -SO<sub>2</sub>-, y is 0 or an average number from 1 to about 30, n and z are independently 0 or 1, and R<sup>9</sup> is hydrogen or hydrocarbyl or substituted hydrocarbyl;

(h) an amine oxide having the formula:

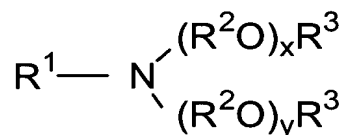




(8)

wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl,  $-(\text{R}^4\text{O})_x\text{R}^5$ , or  $-\text{R}^6(\text{OR}^4)_x\text{OR}^5$ ;  $\text{R}^4$  in each of the  $x$  ( $\text{R}^4\text{O}$ ) groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^5$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms,  $\text{R}^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms,  $x$  is an average number from 1 to about 50, and the total number of carbon atoms in  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is at least 8;

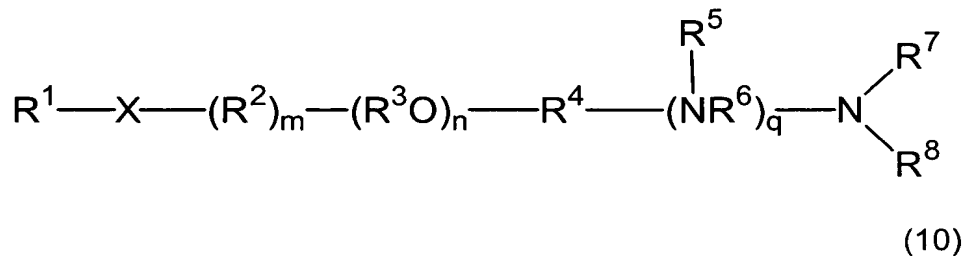
(i) a dialkoxylated amine having the formula:



(9)

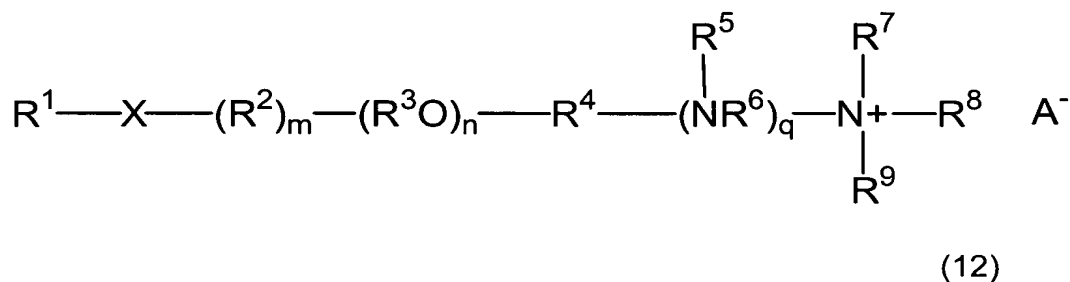
wherein  $\text{R}^1$  is a hydrocarbyl or substituted hydrocarbyl having from about 6 to about 30 carbon atoms, or  $-\text{R}^4\text{SR}^5$ ,  $\text{R}^4$  and  $\text{R}^2$  in each of the  $x$  ( $\text{R}^2\text{O}$ ) and the  $y$  ( $\text{R}^2\text{O}$ ) groups is independently  $\text{C}_2$ - $\text{C}_4$  alkylene,  $\text{R}^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms,  $\text{R}^5$  is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and  $x$  and  $y$  are independently an average number from 1 to about 40;

(j) an aminated alkoxyated alcohol having the following chemical structure:

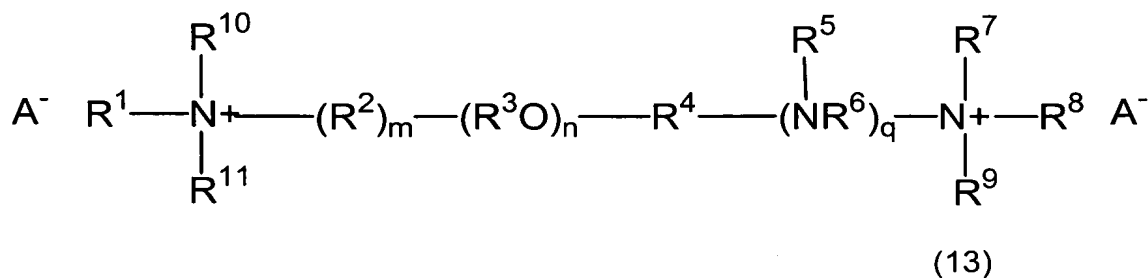


wherein  $R^1$ ,  $R^7$ ,  $R^8$ , and  $R^9$  are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{11})_s(R^3O)_vR^{10}$ ;  $X$  is  $-O-$ ,  $-OC(O)-$ ,  $-C(O)O-$ ,  $-N(R^{12})C(O)-$ ,  $-C(O)N(R^{12})-$ ,  $-S-$ ,  $-SO-$ ,  $-SO_2-$  or  $-N(R^9)-$ ;  $R^3$  in each of the  $n$   $(R^3O)$  groups and the  $v$   $(R^3O)$  groups is independently  $C_2-C_4$  alkylene;  $R^{10}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $R^2$  and  $R^{11}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms;  $R^{12}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $q$  is an integer from 0 to 5; and  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

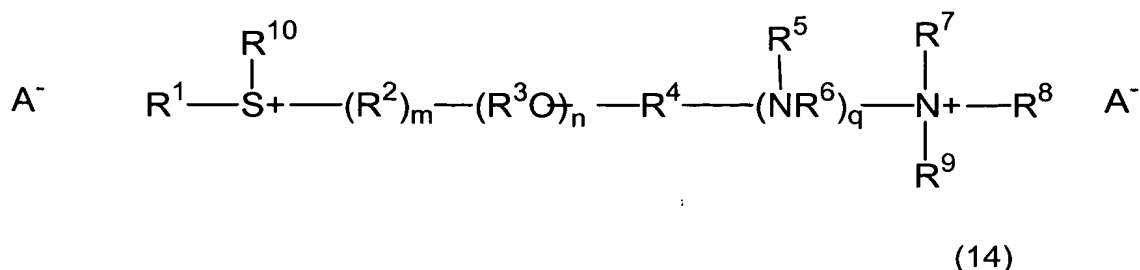
(k) a quaternary ammonium, sulfonium and sulfoxonium salt having the formula:



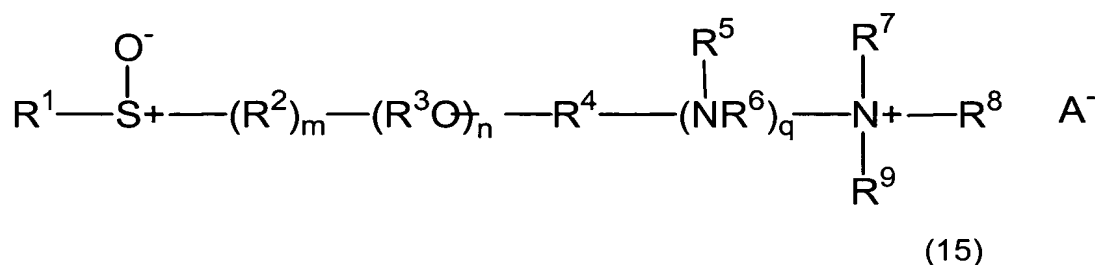
or



or

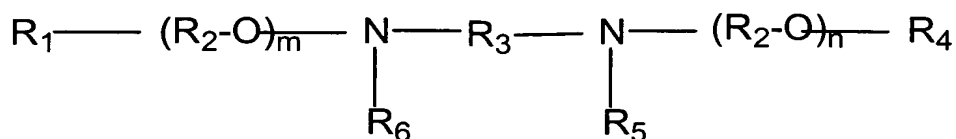


or



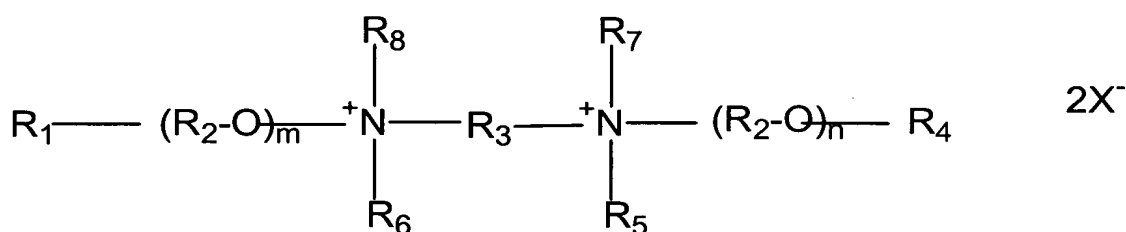
wherein  $R^1$ ,  $R^7$ ,  $R^8$ ,  $R^9$ ,  $R^{10}$  and  $R^{11}$  are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or  $-(R^{13})_s(R^3O)_vR^{12}$ ;  $X$  is  $-O-$ ,  $-OC(O)-$ ,  $-N(R^{14})C(O)-$ ,  $-C(O)N(R^{14})-$ ,  $-C(O)O-$ , or  $-S-$ ;  $R^3$  in each of the  $n$   $(R^3O)$  groups and  $v$   $(R^3O)$  groups is independently  $C_2$ - $C_4$  alkylene;  $R^{12}$  is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms;  $n$  is an average number from 1 to about 60;  $v$  is an average number from 1 to about 50;  $R^2$  and  $R^{13}$  are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms;  $m$  and  $s$  are each independently 0 or 1;  $R^4$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms;  $R^6$  is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms,  $-C(=NR^{12})-$ ,  $-C(S)-$ , or  $-C(O)-$ ;  $R^{14}$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $q$  is an integer from 0 to 5;  $R^5$  is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each  $A^-$  is an agriculturally acceptable anion;

(I) a diamine or diammonium salt having the formula:



(16)

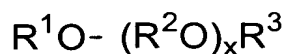
or



(17)

- 5 wherein  $R^1$ ,  $R^4$ ,  $R^5$ ,  $R^6$ ,  $R^7$  and  $R^8$  are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $m$  ( $R^2O$ ) and  $n$  ( $R^2O$ ) groups and  $R^9$  are independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or  $-(R^2O)_pR^9$ ,  $m$  and  $n$  are individually an average number from 0 to about 50, and  $p$  is an average number from 0 to about 60;
- 10

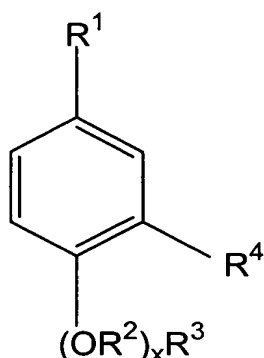
(m) an alkoxyated alcohol having the formula:



(18)

- wherein  $R^1$  is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,  $R^2$  in each of the  $x$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 60;
- 15

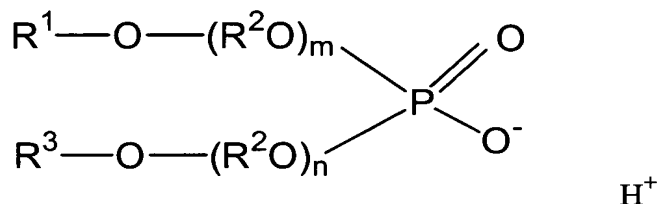
(n) an alkoxyated dialkylphenol having the formula:



(19)

wherein  $R^1$  and  $R^4$  are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of  $R^1$  and  $R^4$  is an alkyl group,  $R^2$  in each of the  $x$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene,  $R^3$  is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and  $x$  is an average number from 1 to about 60;

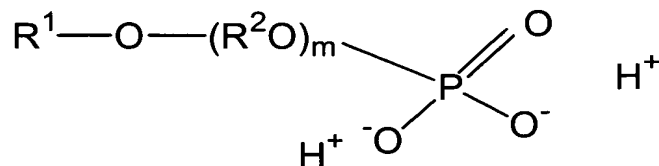
(o) an alkyl alkoxyated phosphate having the formula:



(20)

wherein  $R^1$  and  $R^3$  are independently a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 4 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) and the  $n$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  and  $n$  are independently from 1 to about 30;

(p) an alkyl alkoxyated phosphate having the formula:



(21)

wherein  $R^1$  is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 30 carbon atoms;  $R^2$  in each of the  $m$  ( $R^2O$ ) groups is independently  $C_2$ - $C_4$  alkylene; and  $m$  is from 1 to about 30;

5 and mixtures or combinations thereof.

57. The herbicidal particulate solid of claim 54 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog is at least about 8:1.

58. The herbicidal particulate solid of claim 54 wherein the weight ratio (a.e. basis) of glyphosate to pyridine analog ranges from about 8:1 to about 20:1.

59. A method for killing or controlling the growth of unwanted plants comprising contacting the foliage of said plants with a herbicidally effective amount of the herbicidal composition of any one of claims 28, 33, 37, 38, 39, 42 or 46.

60. A method of killing or controlling weeds or unwanted vegetation comprising:

diluting the liquid concentrate of any one of claims 1, 6, 11, 16, 21, 22, 27 or 52 in a convenient amount of water to form an application mixture; and

5 applying a herbicidally effective amount of the application mixture to the foliage of the weeds or unwanted vegetation.

61. A method of killing or controlling weeds or unwanted vegetation comprising:

dissolving a solid particulate concentrate of claim 54 or 55 in a convenient amount of water to form an application mixture; and

5 applying a herbicidally effective amount of the application mixture to the foliage of the weeds or unwanted vegetation.

62. A method of killing or controlling weeds or unwanted plants comprising:

diluting an aqueous herbicidal concentrate composition in an amount of water to form an application mixture; and

5       applying a herbicidally effective amount of the application mixture to foliage of  
the weeds or unwanted plants, wherein the weeds or unwanted plants comprise  
poison ivy, poison oak, kudzu, multiflora rose, golden rod, blue fescue, red maple,  
and/or red oak, and the aqueous herbicidal concentrate composition comprises  
glyphosate or a herbicidal derivative thereof; a pyridine analog selected from the  
group consisting of triclopyr, clopyralid, dithiopyr, thiazopyr and picloram, or a  
10       herbicidal derivative thereof; and, at least one surfactant.